What is claimed:

1. A process for forming a photoresist pattern comprising the steps:

(a) coating the photoresist composition comprising a thermal acid generator on a substrate to form a photoresist film;

(b) exposing the photoresist film;

(c) developing the exposed photoresist film to obtain a photoresist pattern; and

(d) heating the photoresist pattern.

2. The process according to claim 1, wherein the photoresist composition comprises a thermal acid generator, a chemically amplified photoresist resin, a photoacid generator, and an organic solvent.

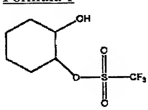
3. The process according to claim 2, wherein the thermal acid generator is an alcohol comprising a leaving group.

4. The process according to claim 3, wherein the leaving group is on an ortho-position of a hydroxyl group.

5. The process according to claim 4, wherein the leaving group is a sulfonate.

6. The process according to claim 2, wherein the thermal acid generator is selected from the group consisting of compounds of the Formulas 1 to 4:

Formula 1



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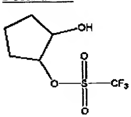
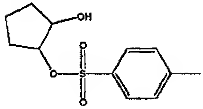
Formula 2



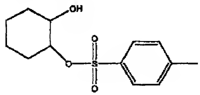
;

Formula 3



; and

Formula 4



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7. The process according to claim 2, wherein the chemically amplified photoresist resin comprises cyclo olefin repeating unit having a hydroxyalkyl group.

8. The process according to claim 7, wherein the chemically amplified photoresist resin further comprises more than one repeating unit selected from the group consisting of cyclo olefin repeating unit having a carboxyl group and maleic anhydride repeating unit.

9. The process according to claim 7, wherein the photoresist resin is poly(tert-butyl bicyclo[2.2.1]hept-5-ene-2-carboxylate / 2-hydroxyethyl bicyclo[2.2.1]hept-5-ene-2-carboxylate / bicyclo[2.2.1]hept-5-ene-2-carboxylic acid / maleic anhydride).

10. The process according to claim 2, wherein the thermal acid generator is used in an amount of 0.1 to 5 % by weight of the photoresist resin.

11. The process according to claim 2, wherein the photoacid generator is selected from the group consisting of diphenyl iodide hexafluorophosphate, diphenyl iodide hexafluoroarsenate, diphenyl iodide hexafluoroantimonate, diphenyl p-methoxyphenyl triflate, diphenyl p-toluenyl triflate, diphenyl p-isobutylphenyl triflate, triphenylsulfonium hexafluoroarsenate, triphenylsulfonium hexafluoroantimonate, triphenylsulfonium triflate, dibutylnaphthylsulfonium triflate, phthalimidotrifluoromethane sulfonate, dinitrobenzyltosylate, n-decyl disulfone, naphthylimido trifluoromethane sulfonate and mixture thereof.

12. The process according to claim 2, wherein the photoacid generator is used in an amount ranging from 0.1 to 10 wt% of the photoresist resin.

13. The process according to claim 2, wherein the organic solvent is selected from the group consisting of diethyleneglycol diethyl ether, methyl 3-methoxypropionate, ethyl 3-ethoxypriopionate, propyleneglycol methyl ether acetate, ethyl lactate, cyclohexanone, 2-heptanone and mixture thereof.

14. The process according to claim 2, wherein the organic solvent is used in an amount ranging from 100 to 2000 wt% of the photoresist resin.

15. The process according to claim 1, wherein the exposing step (b) is carried out by using a light source selected from the group consisting of EUV (Extreme Ultra Violet), VUV (Vacuum Ultra Violet), ArF, KrF, E-beam, X-ray and ion beam.

16. The process according to claim 1, wherein the heating step (d) is carried out at a temperature of the thermal acid generator releasing an acid.

17. The process according to claim 16, wherein the temperature ranges from 150 to 250°C.

18. A semiconductor element manufactured by the process of claim 1.